SERIES A-790 AMPEROMETRIC TITRATOR

This Wallace & Tiernan Products Titrator is ideal for the precise measurement of chlorine residuals, including very low residuals, in municipal and industrial water and wastewater treatment for the calibration of on-line analytical equipment. It is also used at large swimming pools and in food plants, bottling plants, and research and development facilities to calibrate automatic residual-recording and control equipment. It is easy to understand and operate. This encourages frequent testing, makes for close control of the chlorination process. The unit is suitable for the residual tests in Standard Methods and ASTM METHOD D-1253.

FEATURES

- Measures chlorine residuals as low as 1 part per billion.
- Switch selects measurement range: standard down to 0.01 ppm or low range down to 1 /µg/L (1 part per billion).
- Measures free, combined, and total chlorine residuals, as well as residuals of potassium permanganate and chlorine dioxide.
- Standard front titration procedure or back titration capability for wastewater.
- A highly sensitive meter and an adjustable potentiometer make the end point easy to read.
- Measures free residuals as well as the mono- and di-chloramine fractions of combined residuals in the same sample in accordance with Standard Methods.
- Measures sulfur dioxide residuals in dechlorination systems.
- Ideal for wastewater, as sensitivity is not affected by suspended matter or water color.

DESIGN AND CONSTRUCTION

Electronic components are in a corrosion-resistant housing. They include a printed-circuit board, an agitator motor, and a transformer. Also included are a rotary switch with positions for OFF - STANDBY - mg/L (down to 0.01 ppm resolution) - µg/L (down to 1 ppb resolution) and a ten-turn calibration potentiometer. A low-range, high-sensitivity tautband meter handles a wide range of residual values. It resists damage from handling, yet provides a sensitive end-point readout.

Inside the sample container is the cylindrical plastic measuring cell. A plastic agitator cup at the lower end of the cell is coupled to a small motor. During measurement, rotation of the agitator cup assures a continuous flow of sample past the measuring electrode. Agitator rotation also mixes sample and reducing agent rapidly and thoroughly so that the addition of a small amount of reducing agent registers on the meter almost immediately.

Attached to the side of the housing are a 1-ml or a 5-ml commercial lab pipette, a polyethylene bottle, and valves which control flow of reducing agent to the sample container.

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TECHNICAL DATA

Uses: To measure free, combined, and total chlorine residuals as well as residuals of potassium permanganate, chlorine dioxide, and other halogens. The latter are measured by test procedures similar to those for chlorine residuals.

Resolution:
User selectable: 0.01 ppm or 0.001 ppm (1 ppb) residual chlorine.

Sensitivity:
Greater than 0.0005 mg/L (0.5 ppb)

Electrical requirements:
120 V ± 10%, 50/60 Hz, 12 watts.

Materials of construction:
Housing, aluminum with corrosion-resistant enamel finish; sample container and measuring cell, high-impact plastic; titrating-fluid bottle, polyethylene; measuring cell contacts-sockets, gold plated; mixer shaft, silver; electrodes, platinum; base, cast iron with corrosion-resistant finish.

Standard accessories:
Included with the Wallace & Tiernan Products Titrator are: 200-ml sample container; polyethylene bottle for titrating solution; 1- and 5-ml pipettes; drip cup; 4-ounce bottles of phenylarsene oxide, pH 4 buffer solution, pH 7 buffer solution, and potassium iodide; droppers for these chemicals; electrolyte tablets; instruction book.

Overall dimensions:
24" H, 85/8" W, 71/2" D.

Shipping weight:
30 lb.

OPERATION

The sample container is filled to the 200-ml mark. Residual chlorine in the sample causes current to flow between the electrodes. Any change of this current is indicated on the sensitive meter.

1. Measuring free residual*

Phenylarsene oxide is the reducing agent used as the titrating solution. When added from the pipette and mixed by the agitator, it reduces free chlorine. This decreases current flow. When all the free chlorine is reduced and more phenylarsene oxide causes no change in current, the end point has been reached. The amount of phenylarsene oxide added in ml equals free residual chlorine in mg/L or µg/L.

2. Measuring combined residuals† or total residual**

Combined residual is measured by adding potassium iodide to the same sample. Adjusting sample pH with pH 4 or pH 7 buffer permits differentiation of the mono- and di-chloramine fractions. The potassium iodide liberates iodine in proportion to the amount of combined residual in the sample. The iodine is then reduced by the phenylarsene oxide in the same way as a free residual. By titrating the free residual before the combined, both types and fractions of the combined are measured in the presence of each other.

Total residual is measured in one step by following the procedure for combined residual.

*Free residual is that remaining after the destruction with chlorine of ammonia or of certain organic nitrogen compounds.
†Combined residual is produced by the reaction of chlorine with natural or added ammonia or with certain organic nitrogen compounds.
**Total residual is the sum of combined and free residuals.

3. Measuring wastewater residuals

This requires a modification of the standard front titration method known as a "back titration".

When wastewater is measured by the standard "front" titration method, a portion of the liberated iodine may be consumed by constituents of the wastewater so that the answer is too low. To prevent this loss, the titration procedure is modified (by the addition of iodine solution) so that only the slightest trace of free iodine is present in the sample at any one time.

4. Determining sulfur dioxide (sulfite) residuals

In typical feedforward dechlorination systems, the titrator can be used to determine the amount of excess SO_2 in the effluent and thus help control the SO_2 feedrate to the optimum level.

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Taking care of the world's water.

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